Develop a Sustainable Competitive Advantage Strategy For Financial Business by using Blockchain in banking Industry

Chen YongMing[1]

Ntapat Worapongpat[2]

Tachakorn Wongkumchai[3]

[1,2,3]Faculty of Management Science Dhonburi Rajabhat University

Center for Knowledge Transfer, Technology, Community Innovation, Entrepreneurship, Tourism and Education Eastern Institute of Technology Suvarnabhumi (EITS)

Educational Innovation Institute Association for the Promotion of Alternative Education

Email: dr.thiwat@gmail.com Ntapat.w@bkkthon.ac.th Telephone 095 5426414

Received February 10, 2024; **Revised** March 3, 2024; **Accepted** May 25, 2024

Abstract

This Article aimed to study (1) The application of blockchain technology in bank business can help alleviate information asymmetry, reduce operating costs, and optimize business processes. (2)Major banks in China are actively exploring blockchain technology, expanding blockchain application scenarios, and promoting digital transformation. (3) Blockchain technology has become a key technology for banks to actively explore financial technology, comprehensively promote digital transformation, and build scene ecosystems. the sample was selected from 17 management representatives from the financial banking industry who participated in the questionnaire survey. The instrument for collecting data was in the form of a questionnaire. Analysis of data by Descriptive statistics and Content Analysis. The research results were found as follows;

1. The trust mechanism brought about by the technological characteristics of blockchain can change financial architecture. Data storage and transactions on blockchain are all open and transparent, reducing the risk of human operation and ensuring the safety and reliability of transactions. Its decentralized nature can also improve efficiency and reduce transaction costs.

2. The combination of blockchain technology and other financial technologies applied to the banking industry will inevitably create new business models, processes, and financial products.

3. Blockchain technology has been applied in practical scenarios, so it has begun to be applied in broader business scenarios. Starting to explore new areas in our own business, applying blockchain

to applications such as supply chain finance, trade financing, and fund management, empowering our own business.

Keywords: commercial bank; Blockchain: financial technology; Asymmetric information

Introduction

In terms of bill application, blockchain has prevented and controlled the risks of bill business at the technical level. With the application of blockchain in bill transactions, the technical characteristics of blockchain ensure the authenticity and reliability of bills. Problem bills can also be traced at any time, and post-prevention and control are also guaranteed (Song Hanguang, 2018).

Zhejiang Commercial Bank launched a mobile digital bill platform in 2016, applying blockchain technology to the core business scenarios of commercial banks (Zhang Ting, 2019).

Jiangsu Bank's "Suyin Chain" utilizes blockchain technology to reduce moral and operational risks (Yang Xiaowen et al., 2019).

In terms of cross-border payments, commercial banks can innovate in the field of cross-border payments through blockchain technology. Bank of China has conducted international transaction payment practices based on blockchain cross-border payment systems. China Merchants Bank has also utilized blockchain technology for the practice of RMB cross-border payment systems and piloted free trade zone businesses, attempting to smooth the internal cross-border payment process of the system (Li Yongyong, 2018).

In terms of precision poverty alleviation, blockchain technology can help achieve precision poverty alleviation and improve the efficiency of financial precision poverty alleviation. ICBC and the Guizhou government jointly built the industry's first poverty alleviation fund blockchain management platform, helping the government achieve targeted assistance and forming a win-win precision poverty alleviation model for the government, banks, taxation, and other parties. This platform integrates and shares poverty alleviation funds, administrative approval information, and bank fund information through the application of blockchain technology, achieving full process management, greatly improving transparency, and achieving precise investment of poverty alleviation funds (Xu Aihuan and Li Hongyan, 2017; Zhu Mengtian and Xu Chenyue, 2019).

Domestic and foreign scholars generally believe that the application of blockchain technology in banks can reduce information asymmetry and solve trust problems. The application of blockchain technology by banks in their business areas has improved the problem of information asymmetry in traditional businesses and enhanced their competitiveness (Maria Todorof, 2018).

Blockchain technology is based on distributed nodes and consensus mechanisms, creating a centralized credit network that supports the real-time display of transactions, settlements, transfers, and other activities in the blockchain network, thereby solving trust issues between transaction nodes (Cai Ran, 2018).

Blockchain provides a decentralized consensus mechanism, while blockchain records adhere to the principle of immutability. Therefore, blockchain-related technologies can reduce information asymmetry, improve welfare, and increase consumer surplus (Lin William Cong, 2019).

The application of blockchain technology can also reduce bank transaction costs and improve efficiency. After the application of blockchain, all transaction subjects on the blockchain can query and verify information anytime and anywhere through the blockchain network. The blockchain platform helps establish trust among transaction subjects on the chain, thereby promoting business cooperation. The application of blockchain in bank business scenarios reduces bank expenses, improves bank operational efficiency, and reduces the occurrence of fraud (Meiier, 2016).

The use of blockchain can help commercial banks achieve peer-to-peer transactions, register and confirm ownership, and facilitate intelligent management. Blockchain can improve efficiency, reduce costs, and achieve low-cost small payments. Banks can develop financial products based on this characteristic, expand the market, and create new profit points (Guo Xiaobei and Jiang Liang, 2020).

In terms of data storage, security maintenance, and human services, the cost of decentralized transaction models like blockchain is much lower than that of financial intermediary transaction models. Meanwhile, peer-to-peer transactions can efficiently achieve cross-border currency exchange without the need for any intermediary agencies, saving business costs and significantly improving transaction efficiency (Guo and Liang, 2016).

The application of blockchain technology in banks can also improve risk prevention and control capabilities. To reduce credit risk, banks conduct customer credit investigations before providing loans to customers. Obtaining comprehensive customer credit data often requires a significant amount of capital and time costs. Integrating blockchain with the lending business of banks, through the shared database of blockchain, not only can the customer's asset situation and transaction information be accessed at any time, but also the real-time flow of funds can be monitored. All transaction-related information will be synchronized to the blockchain. Therefore, banks can respond more timely and effectively to prevent and control risks in pre-loan review, mid-loan fund supervision, and post-loan event handling (Qiao Haishu and Xie Shanshan, 2017).

Currently, banks are vigorously researching financial technology to promote business innovation, and blockchain technology has a natural compatibility with the banking industry, becoming one of the

key technologies in bank research. The application of blockchain technology in bank business can help alleviate information asymmetry, reduce operating costs, and optimize business processes. Major banks in China are actively exploring blockchain technology, expanding blockchain application scenarios, and promoting digital transformation. Blockchain technology has become a key technology for banks to actively explore financial technology, comprehensively promote digital transformation, and build scene ecosystems.

Research Objectives

1. Study the competitive environment of financial banking business based on blockchain technology.

2.Based on blockchain technology, develop a sustainable competitive advantage strategy for banking and financial services.

Literature Review

Definition of blockchain

In 2008, the term "blockchain" first appeared in the public view, and was first proposed by Japanese Satoshi Nakamoto. Regarding the definition of blockchain, scholars or organizations have provided explanations with different focuses from different perspectives. Among them, the International Organization for Standardization (ISO) defines that blockchain is a distributed ledger formed by using cryptographic technology to add consensus-confirmed blocks in order. From the perspective of legal rationality, blockchain is defined as a civil legal act, with a minimum of three participants. The act is supported by data and then processed using algorithms. Distributed accounting is used throughout the entire process of the act, data cannot be tampered with arbitrarily, and third-party intermediaries are not required. Ultimately, specific transaction purposes can be achieved (Li, 2020). The definition of blockchain is given from the perspective of dynamic changes throughout the entire lifecycle of data. They believe that blockchain is a new decentralized infrastructure and distributed computing paradigm, in which data verification and storage rely on encrypted chain block structures, while distributed nodes and consensus mechanisms ensure data generation and updates, The programming and operation of data rely on smart contracts embedded with automatic execution script code to assist in implementation (Yuan&Wang, 2016). Based on fully considering mainstream definitions from various perspectives and combining my thinking and understanding, this article has decided to define blockchain from the perspective of a technical system: blockchain is not a completely new concept, but a technical system that includes computer technologies such as distributed data storage, smart contracts, peer-to-peer

transmission, consensus mechanisms, encryption algorithms, etc., and the technologies within this system have a completely new composite architecture, To help achieve reliable recording, storage, expression, and transfer of data.

Blockchain is an emerging technology, and currently, scholars have not reached a consensus on the connotation of blockchain. Experts and scholars have expressed different opinions on the connotation of blockchain from their respective perspectives. From a data perspective, blockchain is essentially a decentralized shared data repository, which is jointly maintained by multiple parties to ensure the security and authenticity of data (Mei Haitao and Liu Jie, 2016; Chen Feifei and Wang Xuedong, 2019). From the perspective of protocol, the analysis of blockchain as an Internet protocol shows that blockchain is similar to a network protocol, which can automatically realize point-to-point data exchange and transmission without the participation of third-party intermediaries (Xu Lin and Yuan Guang, 2020). From a technical perspective, it is believed that blockchain is not a single technology, but rather a product of the integration and innovation of various information technologies such as big data, cloud computing, and the Internet of Things (Luo Huiyong, 2016).

Blockchain technology is an emerging technology in recent years. Based on Cryptography theory and distributed systems, it makes data tamper-proof and nondelegable. Every node in the whole network can verify data and reach a consensus. The characteristics of blockchain technology lie in decentralization, nontampering, traceability, nonforgery, programmability, and de-trust.

Decentralization is the core feature of blockchain technology, which essentially ensures data consistency through verification and consensus building at each node in the network without trust intermediaries. This feature is particularly important in supply chain finance risk control, as in traditional credit models, there are often issues such as information asymmetry and trust crises between parties. However, achieving decentralization through blockchain technology can effectively solve this problem.

Another core feature of blockchain technology is its immutability, as it uses hash algorithms and consensus mechanisms to ensure data consistency and security. Therefore, once data is recorded on the blockchain, it cannot be easily modified or deleted. This feature can effectively avoid malicious tampering or fraudulent behavior, reduce trust costs in financial transactions, and improve transaction efficiency and trust.

Blockchain technology can also provide programmability, which can make applications such as smart contracts widely used. This means that we can write and execute automated contract programs on the blockchain, regulate and control financial transactions through automation, avoid disputes between parties, improve transaction transparency and efficiency, and further reduce risks

Therefore, combining the above characteristics of blockchain technology can effectively solve many problems in supply chain financial risk control. In future development, blockchain technology will play a more important role in the field of supply chain finance.

Conceptual Framework

Case analysis of commercial banks introducing blockchain technology. Firstly, the basic situation of commercial banks is introduced. Then, starting from the external environment and the strategic choices of the enterprises themselves, an analysis of the driving forces is carried out. The process of introducing blockchain technology into commercial banks is divided into three stages for application path analysis. Finally, the impact of blockchain technology on commercial banks is analyzed from the aspects of themselves, customers, markets, and risk changes.

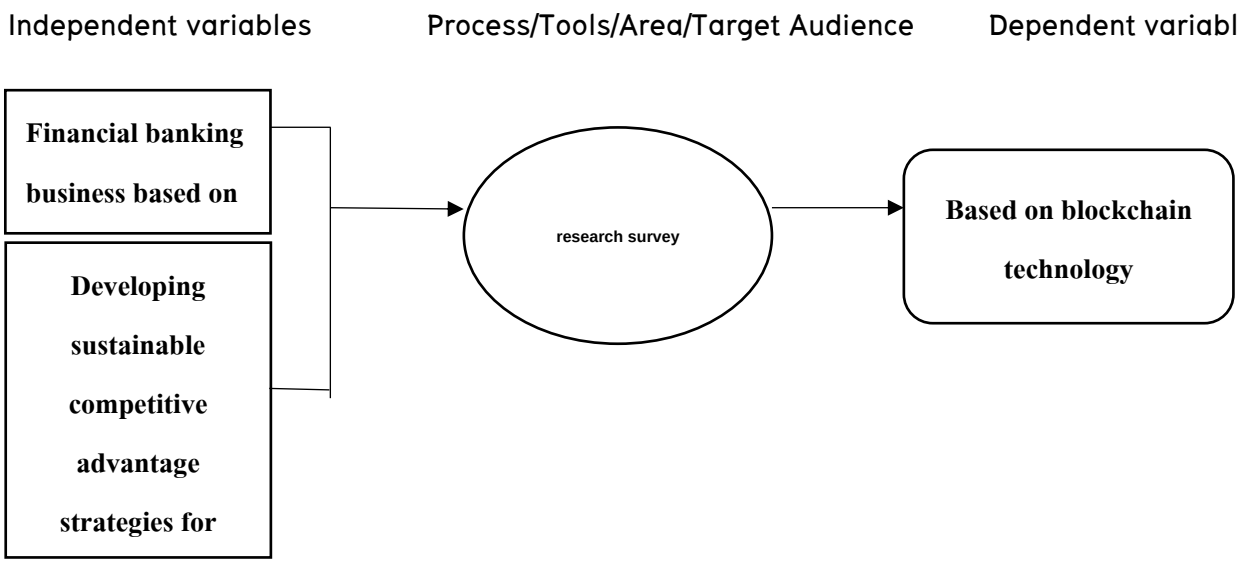


Fig.1 Conceptual Framework

Research Methodology

This study used a combination of quantitative and qualitative methods. To achieve the goal of a sustainable competitive advantage strategy, this study used two data sources, namely primary data and secondary data. The main data is selected through questionnaire surveys and semi-structured interviews to study the sample. The determination of research samples is a purposeful sampling based on the specific characteristics and results of financial institutions within the industry. The secondary data comes from previous research, reports, and documents related to supply chain finance. To conduct a comprehensive analysis of the supply chain finance business, we conducted literature research and conducted in-depth interviews with experts to examine the external and internal environment. After

identifying the key factors affecting financial business, an external factor assessment (EFE) and an internal factor assessment (IFE) were conducted to assess their strengths, weaknesses, opportunities, and threats. Then, the selected factors are used for SOAR analysis to develop a sustainable competitive advantage strategy.

3.2.1 Select 17 financial banks to conduct a questionnaire survey on their management. In the form of a questionnaire, 17 management employees were selected to survey the current market competitiveness, including the basic characteristics of industry analysis, risk monitoring factors, and competitor analysis.

3.2.2 The data analysis of interviews with 17 management members within financial banking institutions examined their core competencies. Then create an External Factor Evaluation (EFE) matrix and an Internal Factor Evaluation (IFE) matrix to provide overall factor evaluation scores.

3.2.3 Experts from the management team of 17 financial banking institutions will brainstorm to conduct SOAR analysis, develop sustainable competitive advantage strategies, and provide implementation guidelines for sustainable competitive advantage strategies.

3.3 Research Instruments

To study the effectiveness of financial business applications based on blockchain technology, we designed a set of survey questionnaires. The survey questionnaire has promoted financial transactions through the application of blockchain technology platforms. The effectiveness was verified through the analysis of experimental results.

3.4 Data Collection

To effectively verify the effectiveness of the financial application proposed in this article, 17 management survey data from financial banks in the market were selected for analysis and exploration. In this empirical study, we selected multiple financial business scenario cases from banking enterprises of different regions and sizes. The collection period is from 2022 to 2023.

3.5 Data Analysis

(1) Descriptive statistical analysis of case data

We conducted descriptive statistical analysis on the data of 17 cases and explored the characteristics and patterns of these data from multiple perspectives. Firstly, we calculated and analyzed the average, median, maximum, minimum, and standard deviation of the transaction amount and duration for each scenario. Secondly, we compared and analyzed case data of enterprises in different industries, regions, and scales, explored their risk characteristics and performance patterns in the financial field, and explored the strategies and methods of financial institutions applying blockchain technology in different scenarios.

(2) Correlation analysis of case data

In the analysis process, we also analyzed the correlation of the case data through statistical methods, mainly including the correlation between transaction amount and transaction cycle, the correlation between transaction amount and loan interest rate, and the correlation between transaction cycle and loan interest rate. Through correlation analysis, we can better understand the impact of different factors on financial business, thereby more accurately grasping the focus and direction of the application.

Based on the above analysis, we can have a more comprehensive understanding of the characteristics and patterns of financial businesses that have applied blockchain technology, providing effective data support for the next empirical analysis.

Research Results

Objective 1. The results showed that Improve asset quality.

Fig.1

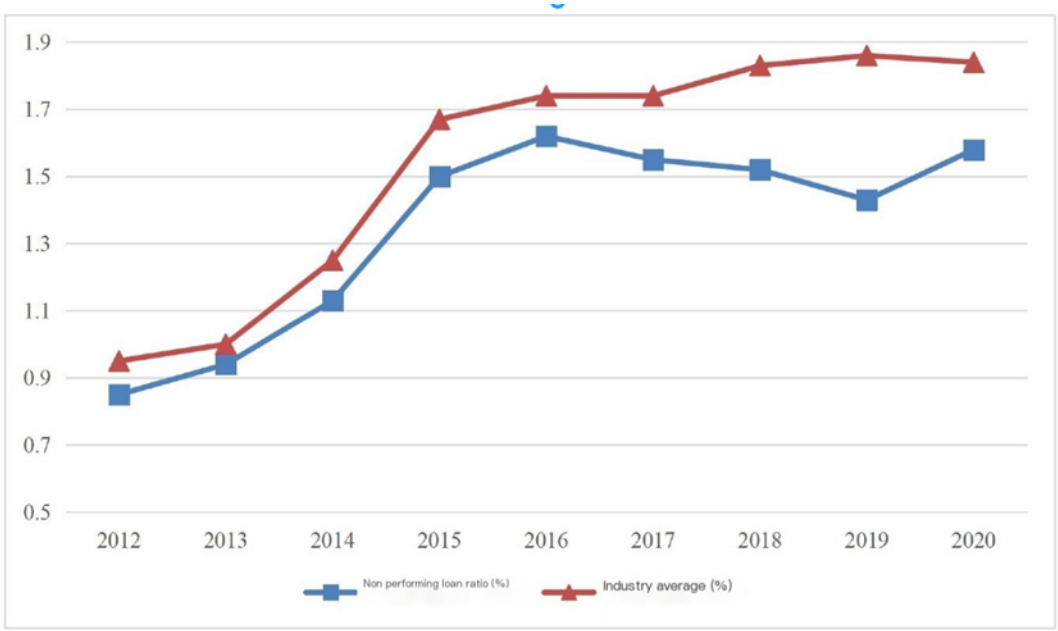


Figure 4.9 Non performing loan ratio from 2012 to 2020

As shown in Figure , the non-performing loan ratio of the entire industry continued to rise from 2012 to 2016, but ICBC's non-performing loan ratio has always been lower than the industry level. Since 2016, while the non-performing loan ratio of the industry has been increasing year by year, ICBC's non-performing loan ratio has shown a downward trend. While the non-performing loan ratio of the entire industry is still deteriorating, ICBC has steadily declined. The abnormal change in 2020 was

mainly affected by the COVID-19, and the non-performing loan rate increased, but still within the regulatory standards. Mainly, ICBC has started to apply blockchain to its own business, solving the problem of information asymmetry and creating a more trustworthy environment. Through the pre loan approval process of enterprise transaction information recorded on the chain, ICBC can more accurately evaluate the customer's credit qualification, and also avoid the previous pre loan investigation process, which may lead to loan risks if the investigation is not sufficient;

Objective 2. The results showed that Reduce costs and increase revenue.

Fig.2

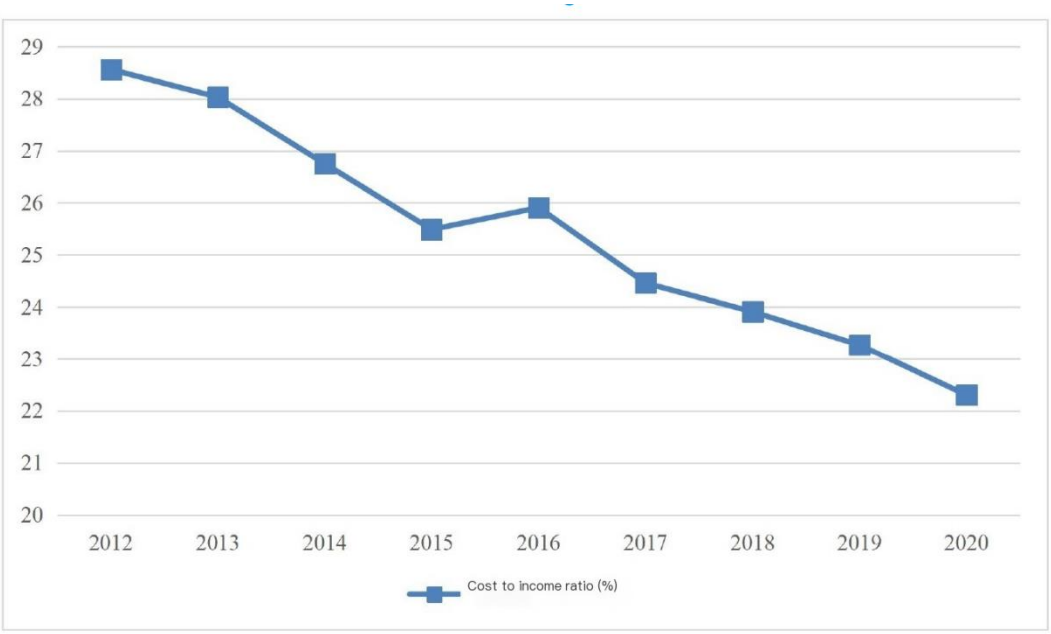
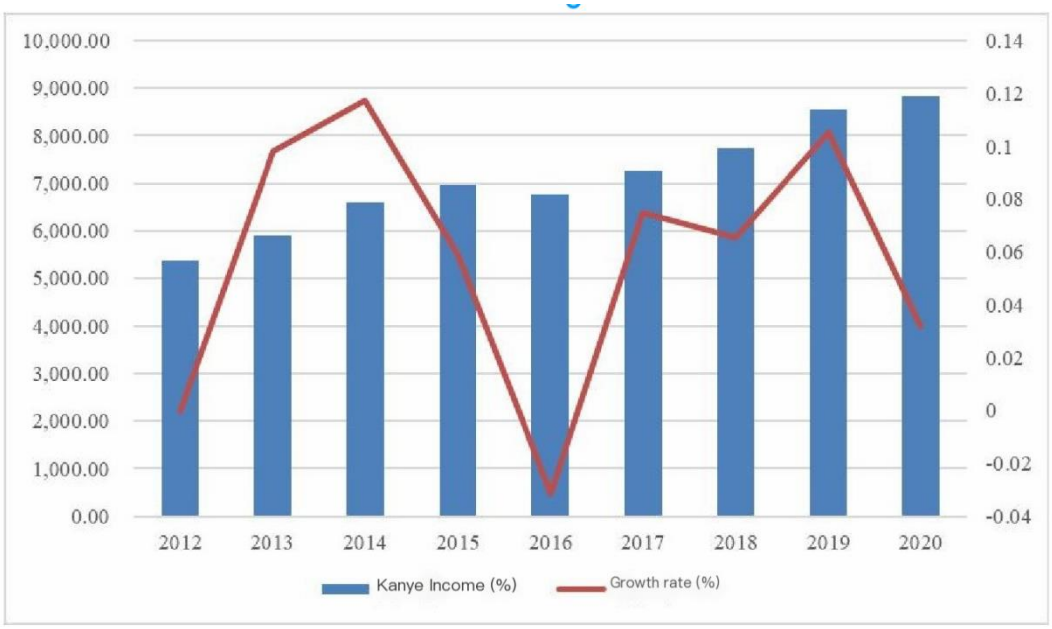


Figure 4.11 Cost to income ratio of ICBC from 2012 to 2020

As shown in Figure , The cost to revenue ratio decreased by 3.61% from 2016 to 2020 after the application of blockchain. The above comparison shows that the application of blockchain technology has greatly reduced the operating costs of ICBC.

Objective 3. The results showed that Increase business revenue.

Fig.3



4.13 Industry revenue from 2012 to 2020

As shown in Figure, ICBC's operating revenue has shown a stable growth trend, but it has been operating since 2014

The growth rate of income has shown a downward trend, even negative growth in 2016, and after 2016, revenue has returned to positive again

Normal level. With the application of blockchain technology in ICBC's business, based on blockchain, ICBC has developed a business-fast loan system

Various loan services such as ICBC e-Credit, ICBC e-Enterprise Payment, and Cross border e-Payment have attracted a large number of customers, thereby increasing The growth point of business revenue.

Discussions

This article first introduces the development status of blockchain in China and analyzes and summarizes the application status of various commercial banks in China. Then, it analyzes the reasons for ICBC's introduction of blockchain from both external and internal perspectives. Then, it explores the application path of ICBC's introduction of blockchain, divides the application path into three stages using the key event trajectory method, and finally analyzes the effects of ICBC's introduction of blockchain on itself and its customers. This article concludes as follows:

(1) The external reasons for ICBC's introduction of blockchain technology mainly stem from the fact that blockchain technology has formed a complete industrial chain in China, and the country has also introduced various policies to support banks in developing technology finance. Blockchain is a key area of national support, and the huge potential of blockchain application in banks has attracted competitors in the same industry to layout and research; The main internal cause is the instability of the economic environment, with ICBC's non-performing loan ratio consistently increasing and the quality of credit assets declining. It is necessary to stabilize the deteriorating trend, and most importantly, to use blockchain technology to promote the company's "e-ICBC" development strategy to new heights.

(2) The application path of ICBC's introduction of blockchain can be divided into three stages according to the critical event trajectory method. The first stage is the opportunity recognition stage, where the advantages of blockchain technology are discovered. Starting from the construction of the basic platform, an independent and controllable blockchain technology platform is developed; Next is the opportunity development stage, where we will try to develop applications according to our own business needs and develop business scenarios in various fields such as supply chain and trade financing; Finally, it is the stage of opportunity expansion, applying blockchain technology to multiple fields such as government affairs and people's livelihoods, and benefiting more people from the research results of blockchain.

Conclusion

The introduction of blockchain by ICBC has achieved remarkable results. For ICBC itself, the quality of credit assets has been improved, the credit structure has been optimized, transaction costs have been reduced, profitability has been enhanced, and enterprise value has been enhanced. For corporate clients, it solves financing problems, reduces financing costs, improves financing efficiency, and helps to form strong industrial alliances among enterprises. For individual customers, business processes have been optimized, business processing efficiency has been improved, and the customer's business experience has been enhanced. The application of blockchain effectively reduces its own credit and operational risks but also brings risks of data security, lack of industry standards, and imperfect regulatory policies.

Suggestions

Suggestions for large commercial banks

Blockchain technology is not a single technology, but a fusion of multiple technologies. Blockchain research requires a long cycle, high development costs, and a higher demand for talent. Large commercial banks have always emphasized technological innovation and are good at using the power of technological innovation to improve their business level. Therefore, they have a certain technical foundation and talent reserves in the research and development of new technologies. Moreover, they have a large scale and sufficient funds to support the development of new technologies. A sound business system also provides a wide range of application scenarios for the practice of new technologies.

For large commercial banks, they should learn from ICBC's proactive role in technology development and platform construction. To avoid duplicate investment of funds and manpower, it is recommended that the People's Bank of China take the lead in coordinating research directions, establishing their blockchain laboratories, actively cooperating with blockchain technology companies, seizing opportunities to improve their technical level, mastering technological advantages, and continuously optimizing blockchain platforms, Promote the layout and application of blockchain in specific business scenarios. We should also actively cooperate with blockchain technology enterprises, leading commercial banks in the industry in blockchain technology research, and national regulatory authorities to jointly develop industry standards that can be applied to the entire banking sector, form a unified set of regulations for the application of blockchain technology in related businesses, enhance the compatibility of blockchain technology between different institutions, and promote the efficient and orderly development of blockchain applications in the banking sector. The integration of blockchain and commercial banks also poses higher requirements for talent. It is necessary to strengthen the talent training mechanism, develop a reasonable talent training model, and focus on cultivating a group of composite talents who understand both finance and blockchain. Large commercial banks should have forward-looking talent reserves. We should also strengthen the learning of existing business personnel about blockchain business, improve their business level, adapt to new technologies, and better utilize blockchain technology to serve customers.

Suggestions for small and medium-sized commercial banks

The development of blockchain technology and the implementation of practical scenarios require a long process, and there is also a risk of failure. Due to the constraints of their scale, technological level, and talent reserves, small and medium-sized commercial banks started their research on

blockchain technology relatively late, and their technical understanding is not deep enough. They have more than enough capacity to research blockchain technology and build platforms.

For small and medium-sized commercial banks, they should clarify their own development goals and focus their work on business. They should combine their business characteristics to engage in deep cooperation with large commercial banks and fintech companies, utilize their existing technological and platform advantages, take a refined development path, continuously explore scenario applications, and achieve their business innovation. Of course, small and medium-sized commercial banks should also strengthen their talent reserves and learn new technologies. After acquiring new technologies, they need certain talent support for the layout and application of technology. Only by quickly mastering technology can they gain a favorable position in future competition with other small and medium-sized commercial banks.

Suggestions to regulatory authorities

The development of blockchain technology is still in its early stages, and its unique technical characteristics have brought significant impacts and challenges to regulation after being applied in the banking business. Regulatory authorities should keep up with the times, distinguish themselves from traditional financial regulatory policies, and formulate targeted laws and regulations for application in the banking sector. They should not overly restrict their ability to create value, nor be too loose and allow for their free development.

Regulatory agencies should improve traditional regulatory methods and form a dynamic and efficient regulatory network. Keep up with the international situation, draw on the regulatory measures taken by the international community for major blockchain events, make predictions on the potential risks that the blockchain technology system may bring, and propose feasible regulatory ideas. Regulatory authorities should also formulate early regulatory policies for the stable development of blockchain technology, including both legal and technical aspects, to form an effective risk prevention and regulatory system. Create a favorable environment for the stable development of blockchain technology.

References

Chen Feifei, Wang Xuedong, Research on Building Government Trust Based on Blockchain [1. E-government, 2019, (12): 56-64]. Mei Haitao, Liu Jie. The Industry Status, Existing Problems, and Policy Suggestions of Blockchain [1. Telecommunications Science, 2016,32 (11): 134-138.

Xu Lin, Yuan Guang. Blockchain: An Effective Tool for Solving Digital Difficulties in Government Governance in the Era of Big Data 1. Journal of Shanghai University (Social Science Edition), 2020,37 (02): 67-78

Luo Huiyong. Principles and Application Value of Blockchain Technology [J1. Financial Zongheng, 2016, (07): 33-37+76]

Xie Zhiju. On the Application of Blockchain Technology in Poverty Governance. People's Forum Academic Frontiers, 2020, (05): 48-56. [6] Zhou Meng, Gao Feng. Analysis of the Current Situation and Prospects of Commercial Banks Using Blockchain Technology. Zhejiang Finance, 2018, (07): 46-53.

Zhang Yi, Xiao Congli, Ning Xiaojing. The Impact of Blockchain Technology on Government Governance Innovation. E-Government, 2016, (12): 11-17. [8] Yuan Yong, Wang Feiyue. Development Status and Prospects of Blockchain Technology [J1. Journal of Automation, 2016,42 (04): 481-494]

Han Xuan, Yuan Yong, Wang Feiyue. Blockchain security issues: research status and prospects 1. Journal of Automation, 2019,45 (01): 206-225]

Zhang Nandiyang. Blockchain Government Services: Technology Empowerment and Administrative Power Reconstruction [1. China Administrative Management, 2020, (01): 69-76

Wang H, Qin H, Zhao M, et al. Blockchain based fair payment smart contract for public cloudstorage auditing J Information Sciences, 2020519: 348-362 [12] Yuan Y, Wang F Y. Blockchain: the state of the art and future trends Jl Acta Automatica Sinica. 2016,42 (4): 481-494

Zhu Wanjing. Multi center Collaborative Governance Based on Blockchain Technology: The Operational Gate of Technological Promoting Institutions. E-Government, 2021, (05): 58-70

Cheng Xuejun, Yin Zhentao, Li Xinhe. Exploration of Financial Technology Innovation and Regulatory Paths: A Research Perspective Based on Regulatory Technology. E-government, 2021, (01): 43-56

Huang Zhuo, et al. Lecture on Digital Finance [M1. Beijing, Renmin University of China Press, 2017: 104.

Dong Ning, Zhu Xuantong. Blockchain Technology Evolution and Industrial Application Outlook Gate 1. Information Security Research, 2017.3 (03): 200-210

Dong Ning, Zhu Xuantong. Evolution and Industrial Application Prospects of Blockchain Technology [1. Information Security Research, 2017,3 (03): 200-210

Antonopoulos A. M. Mastering Bitcoin: unlocking digital cryptocurrencies [M] "O'Reilly Media, Inc.", 2014

Lin Xiaoxuan. The Application of Blockchain Technology in the Financial Industry [1. China Finance, 2016, (08): 17-18.

Michal Kowalski Blockchain technology and trust relationships in trade financialJ Technical Forecasting&Social Change, 2021 (2): 12-20. [20] Zhang Yujie. Judicial Application, System Challenges, and Evidence Law Reform of Blockchain Technology. Oriental Law, 2019 (03): 99-109

Siyal A, Junejo A Z, Zawish M, et al. Applications of Blockchain Technology in Medicine and Healthcare: Challenges and Future Perspectives [J] Cryptography, 2019, 3 (1): 3.

Sun Chunlan, "National Promotion of Healthy China Construction", People's Daily, November 27, 2020, 6th edition. [23] Wang Maolu, Lu Jingyi. Research on Blockchain Technology and Its Application in Government Governance [1. E-Government, 2018, (02): 2-14

Taylor S. Distributed ledger technology: beyond blockchain R] Government Office for Science, 2016:41

Zhao Zengkui, Song Junxing, Pang Xinming, et al. Blockchain reshapes new finance [M]. Beijing: Tsinghua University Press, 2017: 99

Hu Bin. Blue Book of Financial Regulation: China Financial Regulatory Report (2018) [M]. Beijing: Social Science Literature Publishing House Society. 2018:217-218

Ding Xiaodong. Algorithm and Discrimination: An Analysis of Algorithm Ethics and Legal Interpretation from the Perspective of the US Education Equality Case [J]. Chinese and Foreign Law, 2017,29 (06): 1609-1623

Zheng Ge. Law of Algorithm and Algorithm of Law [J]. China Legal Review, 2018, (02): 66-85

Huang Rui. Regulatory Research on Financial Blockchain Technology []. Academic Forum, 2016,39 (10): 53-59

Li Jing Risk control and countermeasures for the "blockchain+token economy" []. E-government, 2019, (11): 41-53. [31] Shi Dan. On the value and risks of blockchain technology in digital copyright governance []. Science and Technology and Publishing, 2019, (06): 111-120

Zhang Xiaheng. Research on legal risks and regulatory paths caused by blockchain []. Contemporary Economic Management, 2019, 41 (04): 79-83

Zhang Qingli. The illegal risks of blockchain application and criminal law responses []. Oriental Law, 2019, (03): 72-86

Xie Jie, Risks and Countermeasures of Financial Criminal Law under the Background of Blockchain Technology – From the Perspective of Bitcoin Trading's Impact on the Criminal Law Regulation of Foreign Exchange Crimes [J1. People's Procuratorate, 2017, (08): 63-66

Wu Yanni. Legal Challenges and Regulation of Frontier Applications of Financial Technology – From the Perspective of Blockchain and Regulatory Technology [1. Journal of Dalian University of Technology (Social Sciences Edition), 2018,39 (03): 78-86

Chang Jian, Han Feng, Yang Tao "Blockchain: From Digital Currency to Credit Society" [J1. China Credit, 2020, (03): 126

Fenwick M, Kaal W A, Vermeulen E PM. Regulation tomorrow: what happens when technology is faster than the law [J] Am. U. Bus L. Rev., 2016,6: 561.

Xu Wende, Yin Wenzhe. The main contents of the "supervision sandbox" of the British Financial Conduct Authority and its enlightenment on Internet finance [J1. Hainan Finance, 2016, (11): 54-56+59